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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/629,127  | 07/29/2003  | Chris E. Barns       | ITL.1016US (P16703) | 5928             |
| 21906   | 7590        | 03/30/2004           | EXAMINER            |                  |
| TROP PRUNER & HU, PC<br>8554 KATY FREEWAY<br>SUITE 100<br>HOUSTON, TX 77024 |             |                      | DUONG, KHANH B      |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2822                |                  |

DATE MAILED: 03/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                 |               |
|------------------------------|-----------------|---------------|
| <b>Office Action Summary</b> | Application No. | Applicant(s)  |
|                              | 10/629,127      | BARNES ET AL. |
|                              | Examiner        | Art Unit      |
|                              | Khanh Duong     | 2822          |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 29 July 2003.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 20-24 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-19 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 29 July 2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)          |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date. _____.   |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____.                                   |

## **DETAILED ACTION**

This Office Action is in response to the filing of the application on July 29, 2003.

Accordingly, claims 1-24 are pending in the application.

### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-19, drawn to a process of making a semiconductor device, classified in class 438, subclass 587.
- II. Claims 20-24, drawn to semiconductor device, classified in class 257, subclass 202.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, *form the polysilicon gate structure after the silicide formation process*.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Tim Trop on March 19, 2004, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-24 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

#### ***Claim Objections***

Claim 4 is objected to because of the following informalities: line 2-3, "a mask" should be --the mask-- for constancy; and line 4, "other gate' should be --another gate--.

Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 15-18 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claim 15 recites the limitation "the polysilicon gate structure without silicide" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 19 recites the limitation "said mask" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Other claims are rejected as depending on rejected base claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-6, 10-12, 14 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee (US 6,258,648).**

Re claims 1-6, 10-12, 14 and 19, Lee discloses in FIGs. 2-6 [see accompanying text] a method comprising: protecting a polysilicon gate structure with a silicon nitride hard mask 26 to prevent the formation of a silicide 32 on the gate structure; removing the mask 26 over another gate structure to form a silicide 32 on the other gate structure; etching to remove the mask 26 after forming a silicide 32; forming the polysilicon gate structure including a patterned polysilicon portion 10 and an underlying dielectric layer 8; protecting the underlying dielectric layer 8 from overetching; forming spacers 12 on either side of said polysilicon gate structure to prevent lateral silicide formation.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Kim et al. (US 6,586,288).**

Re claims 7 and 8, instead of polishing, Lee discloses etching to remove the hard mask 26 [see col. 4, ln. 53-55].

Kim et al. (“Kim”) suggests removing a hard mask 31 by etching or polishing [see col. 5, ln. 58-62].

Since Lee and Kim are both from the same field of endeavor, the purpose disclosed by Kim would have been recognized in the pertinent prior art of Lee.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lee as suggested by Kim because removing a hard mask by etching and polishing were art-recognized equivalent techniques as demonstrated by Lee and

Kim at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute one technique for the other.

**Claims 9 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Gardner et al. (US 6,043,157).**

Re claims 9 and 15-18, Lee fails to disclose replacing the polysilicon gate structure with a metal gate replacement.

Gardner et al. (“Gardner”) suggests in FIGs. 2A-2F replacing a polysilicon gate structure 207b with a metal gate replacement 223 for the purpose of forming a temperature sensitive gate electrode [see col. 4, ln. 10-24].

Since Lee and Gardner are both from the same field of endeavor, the purpose disclosed by Gardner would have been recognized in the pertinent prior art of Lee.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lee as suggested by Gardner, since Gardner states at column 4, lines 52-55 that such modification would further enhance device performance by increasing the speed of the device.

**Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Wang et al. (US 6,248,002).**

Re claim 18, Lee fails to disclose using a two-step polish to remove said mask including a first step using a harder pad and a second step using a softer pad.

Wang et al. (“Wang”) expressly suggests in FIG. 6 using a three-step polish including a first step using a harder pad and a second step using a softer pad.

Since Lee and Wang are both from the same field of endeavor, the purpose disclosed by Wang would have been recognized in the pertinent prior art of Lee.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lee as suggested by Wang, since Wang states in the ABSTRACT that such modification would prevent the accumulation of particle impurities on the surface of a semiconductor substrate that contains wofram plugs during the process of polishing the surface of the wafer.

***Conclusion***

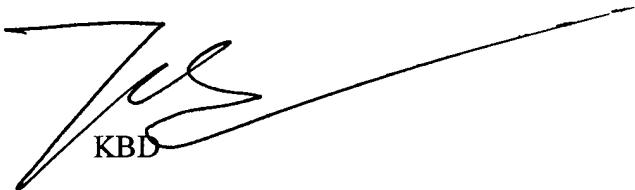
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following US Patents disclose teachings relating to silicide masking layers, dual gates including a metal gate, metal gate substitution, and polishing of substrates: Lin '098, Pey '267, Gardner '487, Rodder '836, Jordan '109, Lee '527 and Wu '311.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on Monday - Thursday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KBD

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JOHN ZABARIAN  
SEARCHER  
SEARCH, REFERENCE & PATENT INFORMATION  
EXAMINER, U.S. PATENT & TRADEMARK OFFICE

A handwritten signature consisting of a stylized 'KBD' followed by a long, sweeping line extending from the bottom left towards the top right. Below the signature, the name 'JOHN ZABARIAN' is printed in a serif font, followed by 'SEARCHER' and 'SEARCH, REFERENCE & PATENT INFORMATION EXAMINER, U.S. PATENT & TRADEMARK OFFICE'.

|   |                                       |                                   |
|---|---------------------------------------|-----------------------------------|
| <b>Examiner-Initiated Interview Summary</b> | <b>Application No.</b>                | <b>Applicant(s)</b>               |
|   | 10/629,127<br>Examiner<br>Khanh Duong | BARNES ET AL.<br>Art Unit<br>2822 |

**All Participants:**

(1) Khanh Duong.

**Status of Application:** \_\_\_\_\_

(3) \_\_\_\_\_.

(2) Tim Trop.

(4) \_\_\_\_\_.

**Date of Interview:** 19 March 2004

**Time:** 8:25 AM

**Type of Interview:**

Telephonic  
 Video Conference  
 Personal (Copy given to:  Applicant  Applicant's representative)

**Exhibit Shown or Demonstrated:**  Yes  No

If Yes, provide a brief description: \_\_\_\_\_

#### **Part I.**

Rejection(s) discussed:

N/A

Claims discussed:

1-24

Prior art documents discussed:

N/A

#### **Part II.**

##### **SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:**

*Claims 1-24 were subjected to a restriction requirement between two separate inventions: Process and Device. Mr. Trop decided to elect without traverse to prosecute Process claims 1-19.*

#### **Part III.**

It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.  
 It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

(Examiner/SPE Signature)

(Applicant/Applicant's Representative Signature – if appropriate)